Trend Study 18-15-02

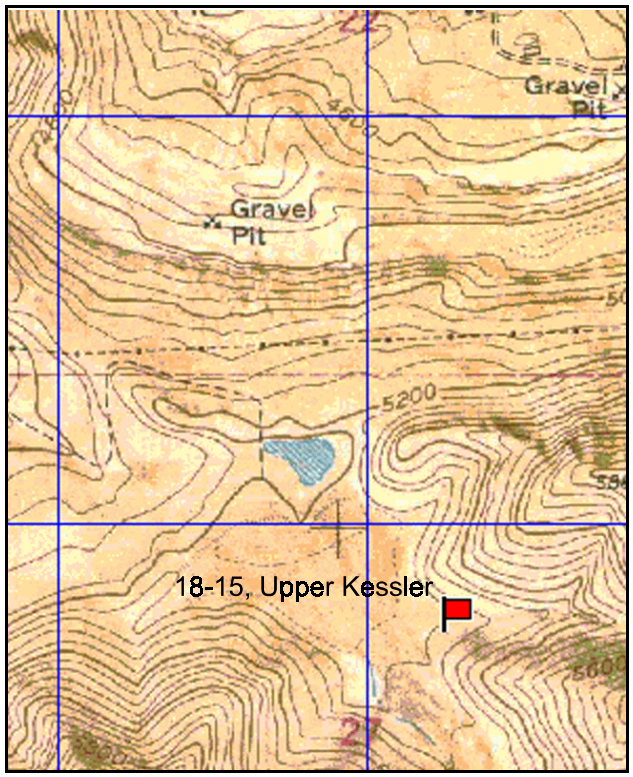
Study site name: Upper Kessler Canyon . Vegetation type: Perennial Grass .

Compass bearing: frequency baseline 110 degrees magnetic (Lines 3-4 @ 91°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

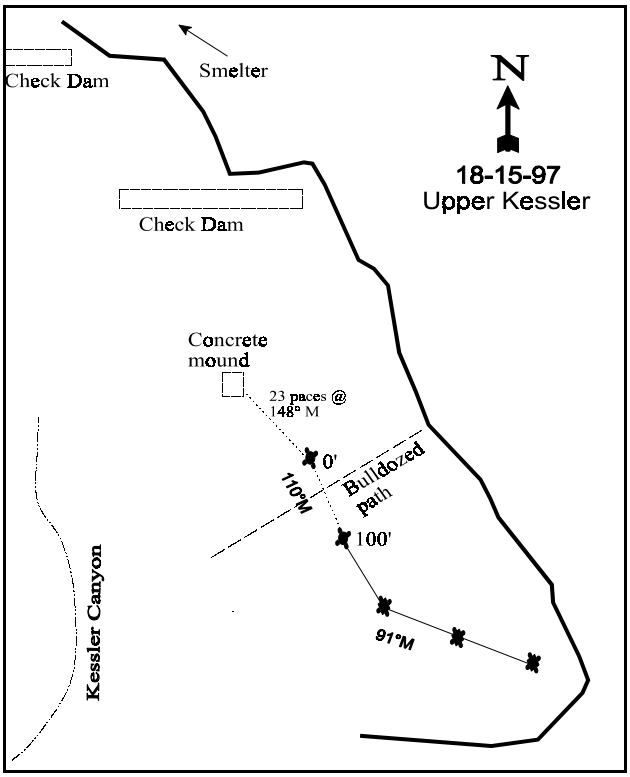
LOCATION DESCRIPTION

From Highway 201 turn left (south) at 1160 West to North Warehouse, Gate #24 of Kennecott. Travel to security shack and get permission and an escort to proceed up Kessler Canyon. Contact Paula at the Kennecott Environmental Office (569-7120) before reading the site. From the check dam in upper Kessler Canyon (Smelter Canyon) continue on into the valley for approximately 0.25 miles to a concrete mound. From the concrete mound, walk 23 paces bearing 148 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is a short fencepost with a white top.



Map Name: Farnsworth Peak

Township 1S , Range 3W , Section 27



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4506664 N 401613 E

DISCUSSION

Upper Kessler Canyon - Trend Study No. 18-15

The Upper Kessler Canyon study is located in the upper canyon bottoms owned by Kennecott, just south of the smelter. Decades of pollution from the smelter has caused most of the vegetation on the surrounding hills to die and most of the soil has eroded down into the bottom of the canyon where the trend study is located. The site has been disked and seeded to mostly perennial grass species. The area has a slope of 3-5% with a northwest aspect and an elevation of 5,300 feet. Wildlife use on the site is mostly from elk with some deer use. Pellet group transect data from 2002 estimated 22 elk and 9 deer days use/acre (54 edu/ha and 22 ddu/ha).

The soil surface appears to be a hard-packed clay with a relatively large amount of rock and gravel on the surface and throughout the profile. Effective rooting depth is estimated at only 5 inches. The actual soil depth is obviously deeper but severe soil compaction prevents deeper soil penetrometer readings. Soil texture is a sandy clay loam with a neutral to slightly acid soil reaction (pH of 6.6). Soil temperature is high at 79°F at only about 6 inches in depth. The shallow effective rooting depth and high soil temperature would both be deterrents to the establishment of shrubs onto this site as illustrated by the fact that shrubs were seeded but very few became established. If shrubs are thought to be necessary to improve value as a winter range, interseeding or interplanting of shrubs would be necessary. There is little erosion occurring because of the protective cover from herbaceous species, litter, and lack of significant slope.

In a 1978 line-intercept study, the area was devoid of perennial vegetation and dominated by bare soil, rock, and annual species. By 1990, the study area had been disked, terraced, and seeded to perennial species. The dominant species in the canyon bottom at that time was a large and very robust intermediate wheatgrass. By 1997 and 2002, not much had changed, with intermediate wheatgrass still dominating the area and providing almost all of the total vegetation cover. Without the dominance of the perennial grasses, western ragweed could be more of a problem than it is. Ragweed is the only abundant perennial forb on the site. Other forbs are represented by weedy species such as curlycup gumweed, sunflower, toadflax, and wooly mullein.

1990 APPARENT TREND ASSESSMENT

Soil trend appears stable with a lack of significant slope and good protective cover from herbaceous species and litter. The browse trend is not applicable here for none were sampled and it is not considered a deer winter range. There are a few white-stemmed rabbitbrush and four-wing saltbush on the slopes surrounding the site. The herbaceous understory has improved from what was here before the treatment and seeding.

1997 TREND ASSESSMENT

Soil trend is stable with percent bare soil at 9% and good protective cover. Browse trend is not applicable here for none were sampled on the site. Pellet group data indicates that elk inhabit the area (32% quadrat frequency), but deer do not (no pellet groups were sampled). The herbaceous understory is stable with seeded grasses still dominating. However, 85% of the forb cover is contributed by western ragweed, yet forbs only make up 12% of the herbaceous understory.

TREND ASSESSMENT
soil - stable (3)
browse - not applicable, none were sampled (NA)
herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground has increased and litter cover has declined, but herbaceous cover is abundant and has remained stable since 1997. There is not a problem with erosion on the site due to the gentle terrain and the abundant protective ground cover. There is no shrubs sampled on the site so there is no browse trend. Trend for the herbaceous understory is also stable. Sum of nested frequency of perennial grasses has remained similar while frequency of perennial forbs has increased. Intermediate wheatgrass remains the dominant species as it provides 99% of the grass cover and 86% of the total vegetation cover. The forb composition is poor with several weedy species sampled including ragweed, thistle, curlycup gumweed, sunflower, toad flax, and wooly mullein.

TREND ASSESSMENT
soil - stable (3)
browse - not applicable, none were sampled (NA)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'97	'02	'90	'97	'02	'97	'02
G	Agropyron intermedium	a286	b306	b307	98	97	98	27.99	29.17
G	Bromus tectorum (a)	-	67	51	-	24	20	.39	.35
G	Poa bulbosa	-	-	5	-	-	3	-	.04
G	Poa fendleriana	3	5	-	1	3	-	.04	-
G	Poa pratensis	b23	b10	a-	10	4	-	.09	-
Total for Annual Grasses		0	67	51	0	24	20	0.39	0.35
Total for Perennial Grasses		312	321	312	109	104	101	28.13	29.21
Total for Grasses		312	388	363	109	128	121	28.52	29.56
F	Ambrosia psilostachya	a-	b70	b62	-	28	24	3.25	1.36
F	Aster chilensis	b25	a2	a-	11	1	-	.00	-
F	Cirsium spp.	-	2	3	-	1	3	.00	.04
F	Comandra pallida	-	-	1	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	a34	b76	-	18	33	.28	.85
F	Equisetum spp.	-	-	2	-	-	1	-	.00
F	Eriogonum brevicaule	a-	a-	b28	-	-	13	-	.26
F	Grindelia squarrosa	b27	a4	ab15	12	4	6	.22	.38
F	Helianthus annuus (a)	-	a-	b20	-	-	9	-	.82
F	Lactuca serriola	2	14	9	1	6	4	.06	.02
F	Linaria dalmatica	a-	a-	b36	-	-	15	-	.63
F	Mentzelia spp.	-	-	1	-	-	1	-	.38
F	Medicago sativa	b11	a-	ab3	5	-	1	-	.06
F	Solidago spp.	B18	a-	a-	8	-	-	-	-
F	Verbascum thapsus	-	-	7	-	-	3	-	.04

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'90	'97	'02	'90	'97	'02	'97	'02
Total for Annual Forbs		0	34	96	0	18	42	0.28	1.68
Total for Perennial Forbs		83	92	167	37	40	72	3.55	3.19
Total for Forbs		83	126	263	37	58	114	3.84	4.87

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 18 , Study no: 15

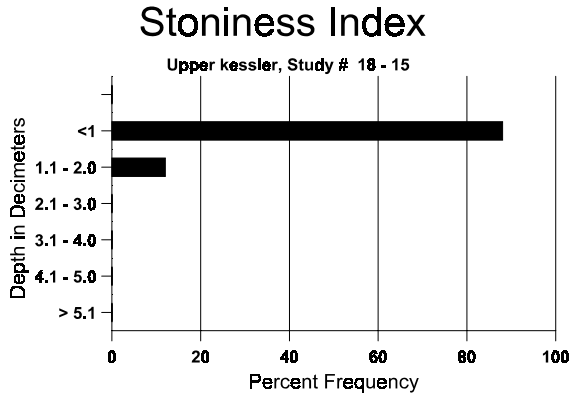
Type	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Elaeagnus angustifolia	0	0	-	.15
Total for Browse		0	0	0	0.15

BASIC COVER --
Herd unit 18 , Study no: 15

Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'90	'97	'02
Vegetation	321	322	0	33.99	33.88
Rock	261	237	0	23.40	21.96
Pavement	114	121	0	2.83	3.69
Litter	377	368	0	44.82	34.93
Cryptogams	105	102	0	2.83	4.77
Bare Ground	123	153	7.50	8.89	14.36

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 15, Upper Kessler

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
5.0	79.0 (5.9)	6.6	52.3	26.2	21.6	1.0	28.4	134.4	0.7



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 15

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'97	'02	⁄02	⁄02
Elk	32	4	287	22 (55)
Deer	-	2	113	9 (21)